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US 3824632 A
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(54) Abstract Title
Cleaning method and cleaning agent for flush toilets

(57) A method for cleaning a supply tank and a water delivering line of a flushing toilet having a supply tank (1), an inflow pipe (2), a bowl (3), and an outflow pipe (4) into a cesspit or other disposal system (5) comprises depositing microorganisms into the supply tank (1) to catabolize and digest organic matter which causes odour or contamination and flushing the toilet so as to deliver the flushing water from the tank together with the microorganisms presented therein through said water delivering line. Organic matter adhered to the inside of the water delivering line is thereby catabolized and digested by the microorganisms.

An agent for cleaning flush toilets comprises one or more types of microorganism which produces one or more types of enzyme for catabolizing the organic matter.

The microorganisms include bacillus subtilis, licheniformis and polymxa. The enzymes includes amylosis, proteolytic, lipolysis and cellulolytic enzymes.

F I G. 1

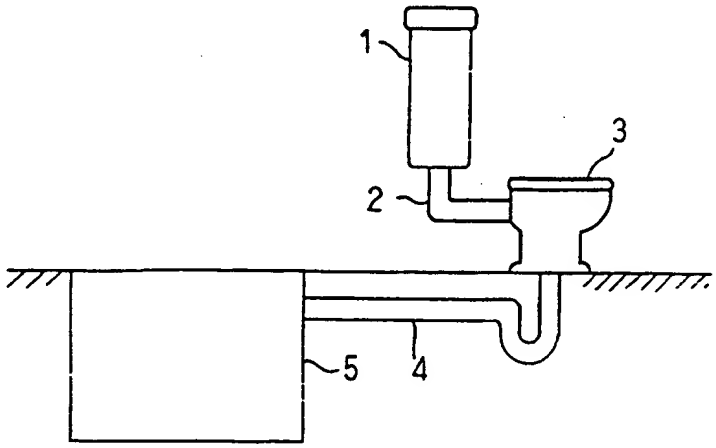

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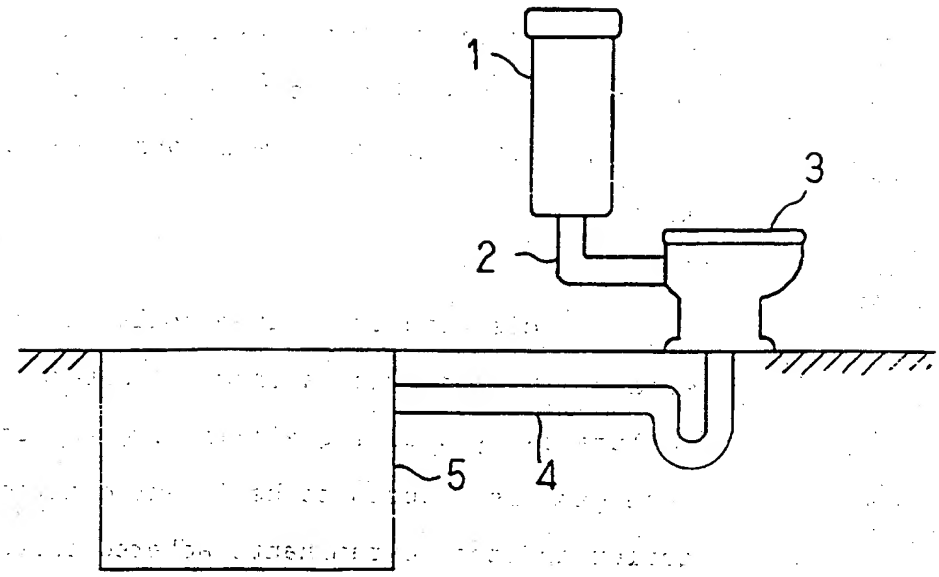
FIG. 1



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A CLEANING METHOD AND CLEANING AGENT FOR FLUSH TOILETS USING MICROORGANISMS

The present invention relates to a method for cleaning a water delivering line of a flush toilet from a supply tank to a cesspit or other disposal system by catabolizing and digesting with microorganisms the organic matter adhered thereon as causative agent of odour or contamination, and a cleaning agent including microorganisms employed in the method.

The cleaning of a flush toilet is conventionally effected by employing a chemical detergent to remove pollutants by applying alakli or acids thereto. The detergent is adapted to be injected directly to the flush toilet and the contaminants adhered thereon are removed by rubbing with a brush or the like.

In the above mentioned prior cleaning procedure, the object to be cleaned is a bowl itself of the toilet. However, the pollutants such as apergillus niger will also propagate and adhere in the water delivering line of the flush toilet from the supply tank to the bowl. These dirts will produce malodor, and flow out through the inflow tube into the bowl to contaminate the bowl.

In the conventional cleaning procedure utilizing a chemical detergent, cleaning nothing but the bowl of the toilet can be effected, since the rubber sealing materials or other parts of synthetic resin included in the water delivering line other than the bowl will be attacked by alkalines or acidities of the detergent. In addition, there are risks of producing gases toxic to human beings when mixed with the other kind of chemical detergent.

Further, when the cesspit of the flushing toilet is a sewage purifier of aeration type, the bacteria living in the purifier and catabolizing the organic matter therein will be killed by alkalines or acidities of the chemical detergent, and the function of the purifier will be ruined.

There are many processes in the prior art for cleaning the toilet other than those mentioned above, such as the process in which the cleaner including the surface active agent and the perfume as main ingredients thereof is added to the supply tank to make cleaning without damaging the water delivering line; the process in which an enzyme for catabolizing the organic matter is extracted from cultured microorganisms, and make cleaning the toilet by the cleaning agent including the extracted enzyme. However, neither of these processes is effective in their cleaning activity, and there are no cleaning methods or cleaners which are

able to remove effectively the dirts of the flush toilet without damaging the supply tank and lines from the supply tank to the cesspit or other disposal system.

Accordingly the object of the present invention is to provide a method and an agent for cleaning safely a water delivering line of a flush toilet from a supply tank to a cesspit or other disposal system without producing toxic gases.

These and other objects are achieved by a method of the present invention wherein microorganisms are deposited into the supply tank to catabolize and digest the organic matter as a causative agent of the dirt or the malodor; the flush toilet is used to deliver the flushing water from the tank together with the microorganisms presented therein through said water delivering line; and organic matter adhered to the inside of the water delivering line is also catabolized and digested by the microorganisms.

The microorganisms are either one of the microorganisms having a productivity of amylosis enzyme; the microorganisms having a productivity of proteolytic enzyme; the microorganisms having a productivity of lipolysis enzyme for catabolizing the vegetable or animal fat; and the

microorganisms having a productivity of cellulolytic enzyme, or those containing two or more such microorganisms blended in an optimum percentage.

The cleaning agent of the present invention may include the microorganisms having a productivity of an enzyme catabolizing an organic matter as a causative agent of dirts or malodor of the toilet.

The microorganisms included in the cleaning agent of the present invention may be either one of the microorganisms having a productivity of amylosis enzyme; the microorganisms having a productivity of proteolytic enzyme; the microorganisms having a productivity of lipolysis enzyme for catabolizing the vegetable or animal fat; and the microorganisms having a productivity of cellulolytic enzyme, or that contain these microorganisms blended in an optimum percentage.

Further features of the present invention will become apparent to those skilled in the art to which the present invention relates from reading the following specification with reference to the accompanying drawing, in which:

Fig. 1 is a schematic representation showing the structure of the water delivering line of the flush toilet;

A preferred embodiment of a method for cleaning the flush toilet and a cleaning agent in accordance with the present invention will now be described in detail with reference to the attached drawing.

The cleaning agent of the present invention includes bacterias or microorganisms such as those listed below in a predetermined percentage.

- the bacillus subtilis having a productivity of amylase as amylosis enzyme and a protease as proteolytic enzyme;
- the bacillus licheniformis having a productivity of lipase as lipolysis enzyme; and
- the bacillus polymxa or the bacillus subtilis cellurase having a productivity of protopectiase or cellulase as cellulolytic enzyme.

Each of these microorganisms comprise a predetermined composition of the cleaner.

Each of said above mentioned bacterias is sporangium one, and resistances to heat or chemical agent are remarkable in its spore condition so that it can strage under the stabilized condition.

The bacteria are not intended to be used as they are. The above listed bacterias are added to the mixture of water, surface active agent, rot proof agent, chelating agent, and stabilizing agent, so that the number of the bacteria presented in the mixture is within the range from 1×10^6 to 1×10^9.

The surface active agent is adapted to be added to the mixture in order to facilitate the contact of the bacterias with the surface of the organic matter as a causative agent of malodor. Preferably, the surface active agent of an non-ionic one such as ethoxylate or alkylphenol is utilized because the affection to be provided on the activity and propagation of the bacterias is light. The rot proof agent is adapted to be added to the mixture to prevent the bacterias other than those required from propagation. For example, 1,2-benzisothiazolin-3-1 is employed as the rot proof agent.

The chelating agent and stabilizing agent are adapted to be added to the mixture to suppress the proliferate of the microorganisms within the cleaning agent to stabilize the composition thereof. For example, Tetrasodium-Ethylenediaminetetraacetate is utilized as chelating agent, and dipropylene glycol and sodium hydroxide are utilized as stabilising agent.

Other additives, for example a colouring agent

such as opacifier and pigment, or perfume can be added.

The composition of the cleaning agent is as follows:

ethoxylate or alkylphenol as surfactant; 3-5 %

1,2-benzisothiazolin-3-1 as rot proof agent; less than 1 %

Tetrasodium-Ethylenediaminetetraacetate as chelating agent; less than 1 %

dipropylene glycol and sodium hydroxide as stabilyzing agent; less than 1 %

opacifier; 0.05%

water; the rest

microorganisms; 1×10^7/ml

In the case of the cleaning agent having a composition as listed above, the cleaning agent may be deposited within the supply tank to dilute it to 1/10 by the water within the tank. In concretely, in the case of the 10 liter supply tank of a household toilet, 1 liter of the cleaning agent is delivered into the tank to make the concentration or number of the microorganisms within the tank to the order of 1×10^6/ml.

In the method of the present invention, the cleaning agent having the above listed composition is delivered into the supply tank of the flush toilet, and

then flow it through the water delivering line through the supply tank 1, via the inflow pipe 2, the bowl 3, and the outflow pipe 4, into the cesspit 5.

Upon depositing the required amount of the cleaning agent into the supply tank 1, the cleaning agent is diluted to the predetermined concentration with the water within the tank, and the microorganisms included in the cleaner begin their activity lively.

The microorganisms will then adhere to the organic matter such as aspergillus niger, secrete enzyme to catabolize and digest the organic matter, intake nutrition therefrom, and gain energy to proliferate lively.

More particularly, the bacillus subtilis secretes an amylase as amylosis enzyme and a protease as proteolytic enzyme to catabolize the starch and the protein, the bacillus licheniformis secretes a lipase as lipolysis enzyme to catabolize the vegitable or animal fat, and the bacillus polymxa or the bacillus subtilis cellurase secretes protopectiase or cellulase as cellulolytic enzyme to catabolize the cellulose.

Further a mulodor produced by the organic matter is also removed by the activities of these bacterias.

The microorganisms utilized in the present

invention will connect to the organic matter electrostatically. In concretely, the microorganisms are electrostatically charged in negative, and the organic matter is electrostatically charged in positive, so that these are coupled electrostatically with each other. Once the microorganisms are adhered to the organic matter, the microorganisms hardly separate therefrom even in the stream of flushing water. The microorganisms will surely remain unseparated from the organic matter in the supply tank, so that the microorganisms will catabolize and digest the organic matter in the supply tank until the organic matter in the tank is reduced to zero.

When the trip handle of the flush toilet is activated to deliver the flushing water from the tank 1, the microorganisms which are not adhered with the organic matter in the supply tank will be transferred with the flushing water through the inflow pipe 2, the bowl 3, and outflow pipe 4, into the cesspit 5.

Even when flowing through the inflow pipe 2, the bowl 3, and outflow pipe 4, the microorganisms will be adhered to the organic matter presented in these structure, and will catabolize and digest the organic matter as was effected in the supply tank.

In the method for cleaning the flushing toilet

according to the prior art, the cleaning agent is applied or injected directly to the bowl. In this connection, it is difficult to apply the cleaning agent to the inside of the inflow port to the bowl of the toilet. Further, the cleaning tool such as a brush can not reach the deep side of the outflow port from the bowl of the toilet. However, in accordance with the present invention, the inside of the inflow port and the deep portion of the outflow port can also be cleaned, since the microorganisms flowing therethrough with the flushing fluid will adhere to the organic matter thereon and catabolize and digest it.

The microorganisms delivered into the cesspit 5 will also catabolize and digest the organic matter within the pit. In case the cesspit 5 is sewage purifier, the production of the mulodor can be avoided by catabolizing and digesting of the organic matter through lively propagating the microorganisms.

Although the bacillus subtilis, the bacillus licheniformis, the bacillus polymxa or the bacillus subtilis cellurase are utilized as microorganisms in the above mentioned embodiment, some of these microorganisms can be used, and the other microorganisms which can secrete the same enzyme can be used.

In accordance with the method of the present invention, the microorganisms deposited within the supply tank will catabolize and digest the organic matter present in the tank, intake nutrition therefrom, and gain energy to proliferate and propagate lively. The microorganisms will also catabolize and digest the organic matter present in the inflow tube, the bowl, and the outflow tube, when flowing therethrough with the flushing water. The cleaning action of the microorganisms will surely be remained until the organic matter are exhausted to zero.

In accordance with the method of the present invention, no alkalines or no acidities are used so that the sealing materials of rubber or the parts of synthetic material used in the lines or valves of the flushing toilet are remain intact.

Further, in accordance with the method of the present invention, depositing of the predetermined amount of the microorganisms into the supply tank is only required, and any rubbing of the part or parts of the toilet is not necessary. Any gas toxic to human beings will never be produced, so that the method of the present invention is easy and safety.

In the case that the cesspit is the purifying facility, the function of the facility will not be

affected since the microorganisms employed in the method will also catabolize and digest the organic matter presented therein.

CLAIMS:

1. A method for cleaning, with microorganisms, a flushing toilet having a water delivering line through a supply tank, an inflow pipe, a bowl, and an outflow pipe, wherein

the microorganisms are deposited into the supply tank to catabolize and digest organic matter which causes odour and/or contamination;

the flush toilet is used to deliver the flushing water from the tank together with the microorganisms presented therein through said water delivering line; and

organic matter adhered to the inside of the water delivering line is also catabolized and digested by the microorganisms.

2. A method according to claim 1 wherein said microorganisms include microorganisms which produce an amylosis enzyme.

3. A method according to claim 1 or claim 2 wherein said microorganisms include those which produce a proteolytic enzyme.

4. A method according to any preceding claim wherein said microorganisms include those which produce a lipolysis enzyme to catabolize vegetable or animal fat.

5. A method according to any preceding claim wherein said microorganisms include those which produce a cellulolytic enzyme.

6. A method according to any preceding claim wherein

said microorganisms include two or more of the microorganisms which produce amylosis enzyme, proteolytic enzyme, lipolysis enzyme to catabolize the vegetable or animal fat, and/or cellulolytic enzyme, said microorganisms being blended in an optimum percentage.

7. A cleaning agent for a flushing toilet including microorganisms which produce an enzyme to catabolize the organic matter which causes odour and/or contamination.

8. A cleaning agent according to claim 7 wherein said microorganisms include those which produce amylosis enzyme.

9. A cleaning agent according to claim 7 or claim 8 wherein said microorganisms include those which produce proteolytic enzyme.

10. A cleaning agent according to any one of claims 7 to 9 wherein said microorganisms include those which produce lipolysis enzyme to catabolize vegetable or animal fat.

11. A cleaning agent according to any one of claims 7 to 10 wherein said microorganisms include those which produce cellulolytic enzyme.

12. A cleaning agent according to any one of claims 7 to 11 comprising an optimum percentage blend of two or more microorganisms which produce amylosis enzyme, proteolytic enzyme, lipolysis enzyme, to catabolize the vegetable or animal fat and cellulolytic enzyme.

Patent Office

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Application N :	GB 9807470.1	**Examiner:**	Gavin Dale
Claims searched:	1-6	**Date of search:**	22 June 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): C1C (CSBA, CTBA)

Int Cl (Ed.6): C02F 3/12, 3/34; E03D 9/00, 9/02, 9/03, 9/10

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	US 3824632 (BACH et al) See column 3 lines 32-38	1
X	WPI Abstract Accession Number 96-503499 and JP 08260540 (FUKUTSUKE KOGYO KK) See WPI abstract and Fig's 5 & 7	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.